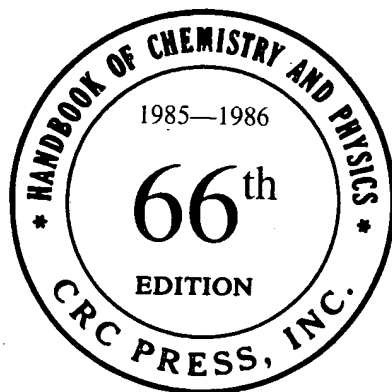


# CRC Handbook of Chemistry and Physics

A Ready-Reference Book of Chemical and Physical Data



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In collaboration with a large number of professional chemists and physicists whose assistance is acknowledged in the list of general collaborators and in connection with the particular tables or sections involved.



CRC Press, Inc.  
Boca Raton, Florida



# INDEX OF REFRACTION

Indices of refraction for elements, inorganic, metal-organic and organic compounds and minerals will be found in the tables of physical constants for the various classes of substances in the section Properties and Physical Constants.

Values for compounds not there listed and data subsequently collected are given below. Indices not otherwise indicated are for sodium light,  $\lambda = 589.3 \text{ m}\mu$ . Other wave lengths are indicated by the value in millimicrons or symbol in parentheses which follows the index. Wave lengths are indicated as follows: He,  $\lambda = 587.6 \text{ m}\mu$ ; Li,  $\lambda = 670.8 \text{ m}\mu$ ; Hg,  $\lambda = 579.1 \text{ m}\mu$ ; A,  $\lambda = 759.4 \text{ m}\mu$ ; C,  $\lambda = 656.3 \text{ m}\mu$ ; D,  $\lambda = 589.3 \text{ m}\mu$ ; F,  $\lambda = 486.1 \text{ m}\mu$ .

Temperatures are understood to be  $20^\circ\text{C}$  for liquids, or ordinary room temperatures in the case of solids. Other temperatures appear as superior figures with the index.

Indices for the elements and inorganic compounds will be understood to be for the solid form except as indicated by the abbreviation liq.

See also under Physical Constants of Inorganic Compounds and index of Refraction of Gases.

## Elements

Name	Formula	Index	Name	Formula	Index
Bromine (liq.)	$\text{Br}_2$	1.661 <sub>18</sub>	Oxygen (liq.)	$\text{O}_2$	1.221-1 <sup>23</sup>
Cadmium (liq.)	$\text{Cd}$	0.82 (579 m $\mu$ )	Phosphorous (yel.) (sol.)		2.1442 <sup>25</sup>
(sol.)		1.13	Selenium	$\text{Se}$	3.00, 4.04
Chlorine (liq.)	$\text{Cl}_2$	1.385	(amor.) (sol.)		2.92
(gas)		1.00768	Sodium (liq.)	$\text{Na}$	0.0045
Hydrogen (liq.)	$\text{H}_2$	1.10974- <sup>252.83</sup> (579 m $\mu$ )	(sol.)		4.22
Iodine (sol.)	$\text{I}_2$	3.34	Sulfur (liq.)	$\text{S}_8$	1.929 <sup>110</sup>
(gas)		1.001920	(amor.) (sol.)		.1998
Lead	$\text{Pb}$	2.6 (579 m $\mu$ )	(rhombic, $\alpha$ )		1.957, 2.0377,
Mercury (liq.)	$\text{Hg}$	1.6-1.9			2.2454
Nitrogen (liq.)	$\text{N}_2$	1.2053-190	Tin (liq.)	$\text{Sn}$	2.1

## Inorganic Compounds

See also under Physical Constants of Inorganic Compounds

Name	Formula	Index	Name	Formula	Index
Aluminum carbide	$\text{AlC}_3$	2.7, 2.75 (700 m $\mu$ )	potassium selenate	$\text{K}_2\text{SeO}_4 \cdot \text{K}_2\text{SeO}_4 \cdot 6\text{H}_2\text{O}$	1.5135, 1.5195, 1.5358
chloride	$\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$	1.560, 1.507	rubidium sulfate	$\text{Rb}_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$	1.4859, 1.4916, 1.5014
oxide	$\text{Al}_2\text{O}_3$	1.665-1.680, 1.63-1.65	selenate	$\text{CuSeO}_4 \cdot 6\text{H}_2\text{O}$	$\alpha$ 1.5225, $\gamma$ 1.5227
Alums. See under appropriate element.			Copper ammonium selenate	$\text{CuSeO}_4 \cdot (\text{NH}_4)_2\text{SeO}_4 \cdot 6\text{H}_2\text{O}$	1.5213, 1.5355, 1.5395
Ammonium antimony tartrate	$2(\text{NH}_4)_2\text{SbO}_4 \cdot \text{C}_4\text{H}_8\text{O}_4 \cdot \text{H}_2\text{O}$	$\beta$ 1.6229 (C)	ammonium sulfate	$\text{CuSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$	1.4910, 1.5007, 1.5054
orthoarsenate, di-H	$\text{NH}_4\text{H}_2\text{AsO}_4$	1.5766, 1.5217	cesium sulfate	$\text{CuSO}_4 \cdot \text{Cs}_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$	1.5048, 1.5061, 1.5153
bromide	$\text{NH}_4\text{Br}$	1.7108	chloride (ic)	$\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$	1.644, 1.684, 1.742
perchlorate	$\text{NH}_4\text{ClO}_4$	1.4818, 1.4833, 1.4881	formate	$\text{Cu}(\text{CHO}_2)_2 \cdot 4\text{H}_2\text{O}$	1.4133, 1.5423, 1.5571
chloroplatinate	$(\text{NH}_4)_2\text{PtCl}_6$	1.8	Copper oxide (ous) (cuprite)	$\text{Cu}_2\text{O}$	2.705
fluoride	$\text{NH}_4\text{F}$	$\omega < 1.328$	potassium chloride	$\text{CuCl}_2 \cdot 2\text{KCl} \cdot 2\text{H}_2\text{O}$	1.6365, 1.6148
acid	$\text{NH}_4\text{HF}$	1.385, 1.390, 1.394	potassium cyanide (ous)	$\text{CuK}_2(\text{CN})_2$	1.5215
hydrogen malate (d)	$\text{NH}_4\text{C}_4\text{H}_4\text{O}_6$	$\beta$ 1.503	potassium selenate	$\text{CuSeO}_4 \cdot \text{K}_2\text{SeO}_4 \cdot 6\text{H}_2\text{O}$	1.5096, 1.5235, 1.5387
nitrate	$\text{NH}_4\text{NO}_3$	1.413, 1.611 (He), 1.63	potassium sulfate	$\text{CuSO}_4 \cdot \text{K}_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$	1.4836, 1.4864, 1.5020
Ammonium sulfate, acid	$\text{NH}_4\text{HSO}_4$	1.463, 1.473, 1.510	strontium sulfate	$\text{Cu}(\text{HCO}_3)_2 \cdot 2[\text{SrHCO}_3]_2$	1.4995, 1.5199, 1.5801
tartrate (dl)	$(\text{NH}_4)_2\text{C}_4\text{H}_4\text{O}_6 \cdot 2\text{H}_2\text{O}$	$\beta$ 1.564	sulfate (ic)	$\text{CuSO}_4$	1.724, 1.733, 1.739
thiocyanate	$\text{NH}_4\text{CNS}$	1.546, 1.685, 1.692	Cyanogen	$\text{C}_2\text{N}_2$	1.327 <sup>14</sup> (liq.)
uranyl acetate	$\text{NH}_4\text{C}_2\text{H}_3\text{O}_2 \cdot \text{UO}_2(\text{C}_2\text{H}_3\text{O}_2)_2$	1.4808, 1.4933	Germanium bromide, tetra-	$\text{GeBr}_4$	1.6269
Antimony bromide	$\text{SbBr}_3$	$> 1.74 +$	Gold sodium chloride	$\text{AuNaCl}_2 \cdot 2\text{H}_2\text{O}$	$\alpha$ 1.545, $\gamma$ 1.75 +
iodide, tri-	$\text{SbI}_3$	2.78 (Li), 2.36	Hafnium oxychloride	$\text{HfOCl}_2 \cdot 8\text{H}_2\text{O}$	1.557, 1.543
Barium cadmium bromide	$\text{BaCdBr}_4 \cdot 4\text{H}_2\text{O}$	$\beta$ 1.702	Ice		1.3049, 1.3062 (A), 1.3001,
cadmium chloride	$\text{BaCdCl}_4 \cdot 4\text{H}_2\text{O}$	$\beta$ 1.651			1.3104 (D), 1.3133, 1.3147 (F)
calcium propionate	$\text{BaCa}_2(\text{C}_2\text{H}_3\text{O}_2)_4$	1.4442	Iron ammonium chloride	$\text{Fe}(\text{NH}_4)_2\text{Cl}_2$	1.6439
fluochloride	$\text{BaCl}_2 \cdot \text{BaF}_2$	1.640, 1.633	ammonium selenate	$\text{FeSeO}_4 \cdot (\text{NH}_4)_2\text{SeO}_4 \cdot 6\text{H}_2\text{O}$	1.5201, 1.5260, 1.5356
fluoride	$\text{BaF}_2$	1.475 also 1.4741	cesium sulfate (ic)	$\text{FeCs}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	1.4839
Barium oxide	$\text{BaO}$	1.980	cesium sulfate (ous)	$\text{FeSO}_4 \cdot \text{Cs}_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$	1.5003, 1.5035, 1.5094
ortho-phosphate, di-	$\text{BaHPO}_4$	1.617, 1.63 $\pm$ , 1.635	rubidium sulfate	$\text{FeRb}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	1.48234
propionate	$\text{Ba}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot \text{H}_2\text{O}$	$\beta$ 1.5175	sulfate (ic)	$\text{Fe}_2(\text{SO}_4)_3$	1.802, 1.814, 1.818
sulfide, mono-	$\text{BaS}$	2.155	thallium sulfate	$\text{FeTi}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	1.52365
Cadmium ammonium chloride	$\text{CdCl}_2 \cdot 4\text{NH}_4\text{Cl}$	1.6038, 1.6042	Lanthanum sulfate	$\text{La}_2(\text{SO}_4)_3 \cdot 9\text{H}_2\text{O}$	1.564, 1.569
cesium sulfate	$\text{CdSO}_4 \cdot \text{Cs}_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$	1.498, 1.500, 1.506	Lead orthoarsenate, di-	$\text{PbHAsO}_4$	1.8903, 1.9097, 1.9765
fluoride	$\text{CdF}_2$	1.56	nitrate	$\text{Pb}(\text{NO}_3)_2$	1.782
magnesium chloride	$(\text{CdCl}_2)_2 \cdot \text{MgCl}_2 \cdot 12\text{H}_2\text{O}$	1.49, 1.5331, 1.5769	Lithium ammonium sulfate	$\text{LiNH}_4\text{SO}_4$	$\beta$ 1.437 (Li)
oxide	$\text{CdO}$	2.49 (Li)	ammonium tartrate (d)	$\text{LiNH}_4(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot \text{H}_2\text{O}$	$\beta$ 1.567, $\gamma$ 1.5673
potassium chloride	$\text{CdCl}_2 \cdot 4\text{KCl}$	1.5906, 1.5907	ammonium tartrate (dl)	$\text{LiNH}_4(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot \text{H}_2\text{O}$	$\beta$ 1.5287
cyanide	$\text{Cd}(\text{CN})_2 \cdot 2\text{KCN}$	1.4213	bromide	$\text{LiBr}$	1.784
rubidium sulfate	$\text{CdSO}_4 \cdot \text{Rb}_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$	1.4798, 1.4848, 1.4948	chloride	$\text{LiCl}$	1.662
Calcium aluminate	$\text{Ca}_3\text{Al}_2\text{O}_6$	1.710	dithionate	$\text{Li}_2\text{S}_2\text{O}_8 \cdot \text{H}_2\text{O}$	1.5487, 1.5602, 1.5788
borate	$\text{CaO} \cdot \text{B}_2\text{O}_3$	1.540, 1.656, 1.682	oxide	$\text{Li}_2\text{O}$	1.644
carbide	$\text{CaC}_2$	$< 1.75$	potassium sulfate	$\text{LiKSO}_4$	1.4723, 1.4717
copper acetate	$\text{CaCu}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 6\text{H}_2\text{O}$	1.436, 1.478	potassium tartrate	$\text{LiK}(\text{C}_2\text{H}_3\text{O}_4)_2 \cdot \text{H}_2\text{O}$	$\beta$ 1.5226 (red)
cyanamide	$\text{CaCN}_2$	1.60, $< 1.95$	rubidium tartrate (a)	$\text{LiRb}(\text{C}_2\text{H}_3\text{O}_4)_2 \cdot \text{H}_2\text{O}$	$\beta$ 1.552
dithionate	$\text{CaS}_2\text{O}_8 \cdot 4\text{H}_2\text{O}$	1.5516, 1.5414	sodium tartrate (dl)	$\text{LiNa}(\text{C}_2\text{H}_3\text{O}_4)_2 \cdot 2\text{H}_2\text{O}$	$\beta$ 1.4904
pyrophosphate	$\text{Ca}_2\text{P}_2\text{O}_7$	1.585, 1.60 $\pm$ , 1.605	Magnesium ammonium selenate	$\text{MgSeO}_4 \cdot (\text{NH}_4)_2\text{SeO}_4 \cdot 6\text{H}_2\text{O}$	1.5070, 1.5093, 1.5169
platinocyanide	$\text{Ca}_2\text{Pt}(\text{CN})_2 \cdot 5\text{H}_2\text{O}$	1.623, 1.644, 1.767	ammonium sulfate	$\text{Mg}(\text{NH}_4)_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	1.4716, 1.4730, 1.4786
strontium propionate	$\text{Ca}_2\text{Sr}(\text{C}_2\text{H}_3\text{O}_2)_4$	1.4871, 1.4956	orthoborate	$3\text{MgO} \cdot \text{B}_2\text{O}_3$	1.6527, 1.6537, 1.6748
sulfide (oldhamite)	$\text{CaS}$	2.137	cesium sulfate	$\text{MgCs}_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	1.4857, 1.4858, 1.4916
sulfite	$\text{CaSO}_3 \cdot 2\text{H}_2\text{O}$	1.590, 1.595, 1.628	chlorostannate	$\text{MgSnCl}_4 \cdot 6\text{H}_2\text{O}$	1.5885, 1.5970
thiosulfate	$\text{CaS}_2\text{O}_3 \cdot 6\text{H}_2\text{O}$	1.545, 1.560, 1.605	fluosilicate	$\text{MgSiF}_6 \cdot 6\text{H}_2\text{O}$	1.3439, 1.3602
Carbon dioxide (liq.)	$\text{CO}_2$	1.195 <sup>14</sup>	platinocyanide	$\text{MgPt}(\text{CN})_2 \cdot 7\text{H}_2\text{O}$	1.5608, 1.91
Cerium dithionate	$\text{Ce}_2(\text{S}_2\text{O}_8)_3 \cdot 15\text{H}_2\text{O}$	$\beta$ 1.507	Magnesium potassium selenate	$\text{MgK}_2(\text{SeO}_4)_2 \cdot 6\text{H}_2\text{O}$	1.4969, 1.4991, 1.5139
Cesium perchlorate	$\text{CsClO}_4$	1.4752, 1.4788, 1.4804	potassium sulfate	$\text{MgK}_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	1.407, 1.4629, 1.4755
nitrate	$\text{CsNO}_3$	1.55, 1.56	rubidium sulfate	$\text{MgRb}_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	1.4672, 1.4689, 1.4779
selenate	$\text{Cs}_2\text{SeO}_4$	1.5989, 1.5999, 1.6003	silicate	$\text{MgSiO}_3$	1.651, 1.654 (calc.), 1.660
thallium chloride	$\text{Cs}_2\text{Ti}_2\text{Cl}_4$	1.784, 1.774	sulfide	$\text{MgS}$	2.271 also 2.268
Chromium cesium sulfate	$\text{Cr}_2\text{Cs}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	1.4810	Manganese borate	$\text{Mn}_2\text{B}_2\text{O}_7$	1.617, 1.738, 1.776
oxide (ic)	$\text{Cr}_2\text{O}_3$	2.5	chloride	$\text{MnCs}_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	1.4946, 1.4966, 1.5025
potassium cyanide (ic)	$\text{CrK}_2(\text{CN})_2$	4.5221, 1.5244, 1.5373	rubidium sulfate	$\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$	1.555, 1.575, 1.607
sulfate (ic)	$\text{Cr}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$	1.564	sulfate (ous)	$\text{MnRb}_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	1.4767, 1.4807, 1.4907
thallium sulfate	$\text{Cr}_2\text{Ti}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	1.5228		$\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$	1.508, 1.518, 1.522
Cobalt acetate	$\text{Co}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 4\text{H}_2\text{O}$	$\beta$ 1.542		$\text{MnSO}_4 \cdot 5\text{H}_2\text{O}$	1.495, 1.508, 1.514
aluminate (Thenard's Blue)	$\text{Co}(\text{AlO}_2)_2$	$< 1.78$ (red), 1.74 (blue)	Mercury chloride (ic)	$\text{HgCl}_2$	1.725, 1.859, 1.965
ammonium selenate	$\text{CoSeO}_4 \cdot (\text{NH}_4)_2\text{SeO}_4 \cdot 6\text{H}_2\text{O}$	1.5246, 1.5311, 1.5396	cyanide (ic)	$\text{Hg}(\text{CN})_2$	1.645, 1.492
cesium sulfate	$\text{CoCs}_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	1.5057, 5.5085, 1.5132	iodide (ic) (red)	$\text{HgI}_2$	2.748, 2.455
chloride (ous)	$\text{CoCl}_2 \cdot 2\text{H}_2\text{O}$	$< 1.624$ , $< 1.671$ , $> 1.67$			